

Exhibit A

IDEA DISCLOSURE FORM

Title of the Invention: Golf Ball Composition

Inventor(s): Hyun J Kim and Hong Jeon

Idea #: B03-09 10

Directions: Complete this form by providing a description of your idea in the area outlined below. You may use the additional sheet if you need more space. Attach any relevant drawings such as CAD drawings, other drawings, test results, etc. Do not forget to sign and date the form, as well as any attached materials, and have them both signed and dated by a witness who understands the subject matter.

I. Concept

Various types of unsaturated polymeric materials, such as elastomers and rubbers, have been used in golf ball with utilization of those mechanical properties developed by crosslinking of unsaturation with thermo/chemical curing or irradiation. One representative example is golfball core, which is obtained mainly from crosslinked polybutadiene with sulfur compounds, or peroxides together with ZnO and metal salt of acrylate, such as ZDA or ZDMA. Depends on the design of a golf ball, core compression can be adjusted to get a desired ball performance. However, it is always preferred for a core to have a highest possible C.O.R, regardless of core compression. Because that is directly related to ball flight distance. It is generally known that increasing loading levels of sulfur compounds, peroxides, or metal salt of acrylates increases core compression and C.O.R. However, it is difficult to decrease core compression without bringing adverse effect on C.O.R. A limited range of adjustments in C.O.R vs. core compression can achieved through optimizing the ratio of activator, co-activator, crosslinking agent, co-crosslinking agent, ...etc. It is the purpose of this invention to adjust rigidity of a material used in a golf ball, without bringing an adverse effect in it's elastic behavior.

II. Method

In rubber industry, chemical plasticizers have been used during rubber compounding to accelerate the softening of rubber under the influence of mechanical force, heat, or combination of those. The addition of chemical plasticizers, or peptizers, permits improved incorporation of chemical ingredients and fillers, and provides lubrication for easier processing, lower power consumption for mixing and lower processing temperatures. It means that peptizer has been used in rubber industry as just a processing aid, not a key component to alter or improve mechanical properties after cure. Through rubber compounding trials and core moldings at TMAc, it has been found that peptizer can be used to decrease the rigidity (can be expressed as hardness, Young's modulus, dynamic modulus, flexural modulus, core compression..., etc) of a material without bringing an adverse effect in it's elastic behavior (can be expressed as Bayshore Rebound, tan δ , or C.O.R), and it is the purpose of this invention to make a golf ball with a composition comprising peptizer and polymer with unsaturation.

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Additional Sheet:

Title: Golf Ball CompositionIdea # B03-0910**II.1. Golf Ball Composition**

- a) golf ball with a composition comprising peptizer and polymer with unsaturation.
- b) core composition for a golf ball comprises peptizer and polymer with unsaturation.
- c) cover composition for a golf ball comprises peptizer and polymer with unsaturation.
- d) composition of at least one intermediate layer comprises peptizer and polymer with unsaturation.
- e) golf ball composition in (a), (b), (c), and (d) further comprises a component selected from a list consisting of initiator, activator, crosslinking agent, co-crosslinking agent, accelerator, ionomeric polymer, non-ionomeric polymer, anti-oxidant, UV-stabilizer, weight adjusting fillers, organic or inorganic fibers, colorant, and processing aids.
- f) The golf ball composition can be used to make 2 pc ball, 3 pc ball, or multilayered golf ball with or without incorporation of wound layer.
- g) The golf ball composition can be used to make a core having more than two core layers.

II.2. Examples of peptizer

Non-limited but some examples of peptizers are:

Zinc salts of fatty acids, oil solutions of high molecular weight sulfonic acids, paraffin mulls of fatty acids, low molecular weight polyethylene, a neutralized sulfonate of high molecular weight in a paraffinic oil (Vanplast R, Vanplast PL from R. T. Vanderbilt Co.), Dinitroso-N-methylaniline (Elastoper from Monsanto Co.), zinc salt of pentachlorothiophenol (Endor from E.I. Du Pont), thiokyleneols (Pitt-Consol 640 from Pitt-Consol Chemical Co.), 4-t-butyl-o-thiocresol (Pitt-Consol-646 from Pitt-Consol Chemical Co.), pentachlorothiophenol (Renacit V from Nafone, RPA 6 from E.I. Du Pont, Struktol A95 from Struktol Co.), 2-naphthalenethio (RPA 2 from E.I. Du Pont), Xylene thials (RPA 3 from E.I. Du Pont), and phenol sulfide (Xylen 780 from Xylos Rubber Co.), 2,2'-dibenzamido-diphenyl disulfide with activating additive and binder (Renacit 11/WG from Bayer), activated 2,2'-dibenzamido-diphenyl disulfide absorbed on a clay (Peptizer 4P, 6P, and Peptizer 66 from Akrochem), o,o'-dibenzamidodiphenyldisulfide (Noctizer SS), zinc 2-benzamidothiophenolate (Noctizer SZ), phenylhydrazine salts, and 1,2-polybutadiene (RICON P-30/D from Sartomer).

II.3. Examples of polymer with unsaturation

Examples of polymeric materials for use within the scope of the present invention comprise any polymeric material having unsaturated hydrocarbon, unsaturated non-hydrocarbon, or mixture of those in the polymer structure, which can participate in a crosslinking reaction by thermal initiation, chemical initiation, irradiation initiation, or combination of those.

Non-limited but some examples of those are:

1,2-polybutadiene, cis-1,4-polybutadiene, trans-1,4-polybutadiene, cis-polyisoprene, trans-polyisoprene, polychloroprene, polyisobutylene, styrene-butadiene rubber, styrene-butadiene-styrene block copolymer, styrene-isoprene-styrene block copolymer, nitrile rubber, silicone rubber, malleable polyurethane, and mixture of those.

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Additional Sheet:

Title: Golf Ball CompositionIdea # B03-09-10**II.A. Examples of Crosslinking Agent**

Sulfur compounds, peroxides, or mixture of those can be used as chemical crosslinking agent. Non-limited but examples of suitable crosslinking agents for use within the scope of the present invention comprise aliphatic peroxides, aromatic peroxides, or mixtures of these. Primary, secondary, or tertiary peroxides can be used, with tertiary peroxides most preferred. Also, peroxides containing more than one peroxy group can be used, such as 2,5-bis-(ter-butylperoxy)-2,5-dimethyl hexane and 1,4-bis-(ter-butylperoxyisopropyl)-benzene. Also, peroxides that are either symmetrical or asymmetric can be used, such as tert. butylperbenzoate and tert. Butylcumylperoxide. Additionally, peroxides having carboxy groups also can be used. Decomposition of peroxides used in compositions within the scope of the present invention can be brought by applying thermal energy, shear, reactions with other chemical ingredients, or a combination of these. Homolytically decomposed peroxide, heterolytically decomposed peroxide, or a mixture of those can be used to promote crosslinking reactions with compositions within the scope of this invention. Examples of suitable peroxide compounds for use in compositions within the scope of the present invention include aliphatic peroxides or aromatic peroxides, such as diacetylperoxide, di-tert-butylperoxide, dibenzoylperoxide, dicumylperoxide, 2,5-bis-(t-butylperoxy)-2,5-dimethyl hexane, 2,5-dimethyl-2,5-di(benzoylperoxy)hexane, 2,5-dimethyl-2,5-di(butylperoxy)-3-hexyne, n-butyl-4,4-bis(t-butylperoxy) valerate, 1,4-bis-(t-butylperoxyisopropyl)-benzene, t-butyl peroxybenzoate, 1,1-bis(t-butylperoxy)-3,3,5-trimethylcyclohexane, and di(2,4-dichloro-benzoyl).

III. Summary of Data

CB10	CB22	CB25	BR40	ZnO	SR416	SR638	ZnPCIP	Varox 231XL	C.O.R	P.G.A-C
400				69	14	126		4	.819	91
400				69	14	126	4.8	4	.816	57
400				69	140		4.8	4	.813	65
	400			69	140		5	4	.811	46
	400			69	140			4	.816	83
		400		69	14	126	4.8	4	.811	59
		400		69	14	126		4	.813	92
			400	69	14	126	4.8	4	.799	35
			400	69	14	126		4	.807	76
				69	14	126	4.8	4	.814	58

4 different grade of rubbers were used for the test with 2 variations in ZDA mixture ratio. For each rubber, comparisons on C.O.R and P.G.A compression were made, with and without adding 4.8 pph ZnPCIP. Overall, adding ZnPCIP greatly decreased core compression with a small decrease in C.O.R. For CB10, the decrease of P.G.A compression was in the range of 26 - 45 with changes in C.O.R in the range of .003 - .008. For CB22, addition of ZnPCIP decreased P.G.A compression by 24 units, while C.O.R. was decreased by 0.005. For CB25, P.G.A compression was decreased by 57 units, while C.O.R was changed from 0.813 to 0.799. This suggests that core compositions previously used to make a core having high C.O.R but with a high compression now can be used to make a core still having a high C.O.R but with a much lower core compression. This finding provides a huge flexibility in developing a core composition without experiencing those limitations coming from the conventional skills and knowledge on core compression vs. C.O.R.

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